

# Mobile and Seamless Learning - Design of contextualized learning scenarios

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**Welten Institute**

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# Theoretical foundations & goals

Situated Learning (Brown, Collins, & Duguid, 1989; Lave & Wenger, 1991)

Pragmatism (Dewey)

Seamless Learning (Wong & Looi, 2011)

Decrease inert knowledge

Increase transfer of knowledge

Bridge contexts



# Examples

1. Location-based learning scenario  
(Cultural sciences)
2. Mindergie: Work-based learning
3. Crisis simulation/training UNHCR
4. HeartRun: First aid & resuscitation
5. Inquiry-based learning: WeSpot



# Example 1



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# Cultural science pilot



# Cultural science pilot



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# Environmental learning @ work

- Gamification at work
- How can we actively decrease energy consumption @ work?
- DBR: Which design aspects are meaningful and can have an impact?



## Welcome to the Mindergie Game!

**Welcome** to the game that helps you become  the greenest employee of the Open Universiteit!



The game is played using the **ARLearn** app developed by Stefaan Ternier working at CELSTEC. Within the app you will mainly use the *Menu* and the *Back* button of your phone to navigate around. From time to time you will also make use of the built-in camera and microphone as well as a web browser.

All game messages will appear in the list you will see when closing this message by using the *Back* button. Some messages open automatically (like this one) while others open when you click on them. Once you opened a message it will grey out in the list, but stay there until the end of the game.

Some messages will ask you to provide either an answer to a question, recording an audio, take a picture, or even capture a short video. When using media, simply add or record it and then press the appearing *Publish* button.

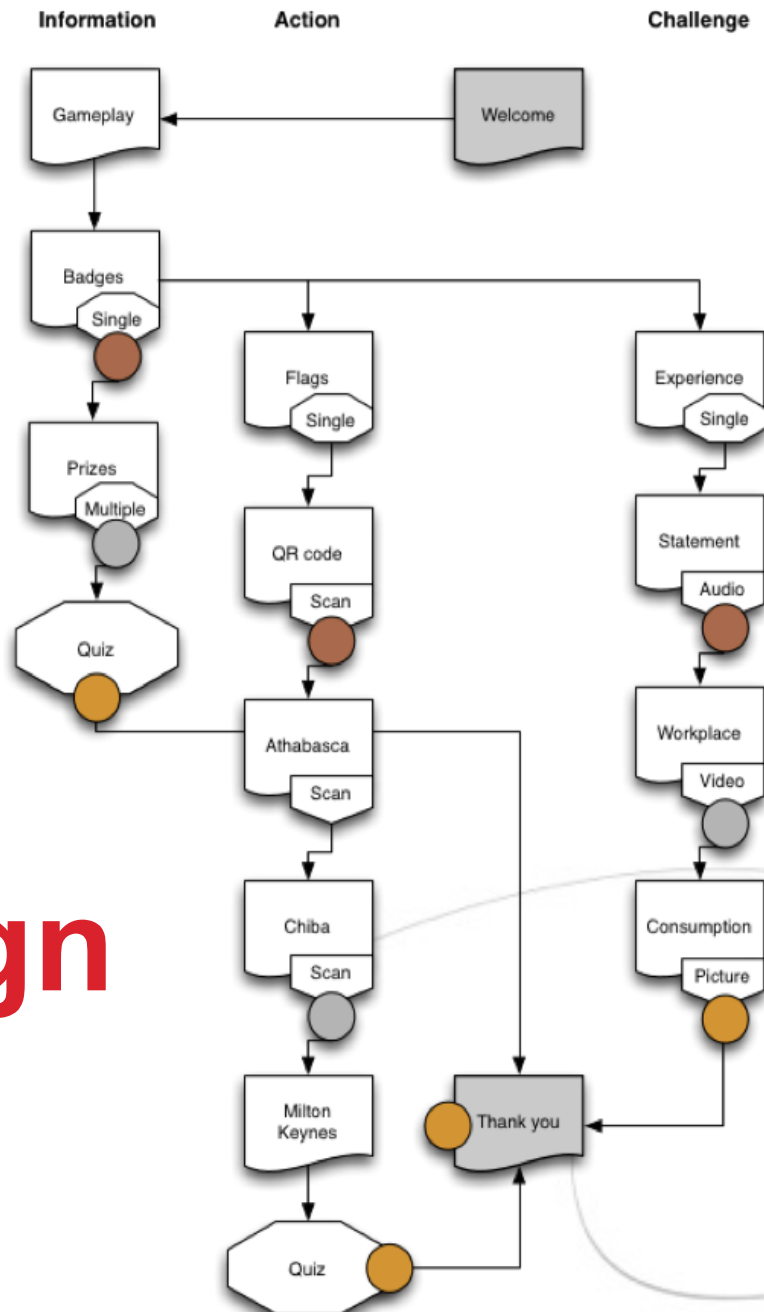
## [Action] QR code

Great you found the Mindergie flags. **The first thing you have to do here is to find the small QR code attached to the 'Athabasca' flag pole.**

When you found it, simply press the scan icon below and use your camera to scan the code.



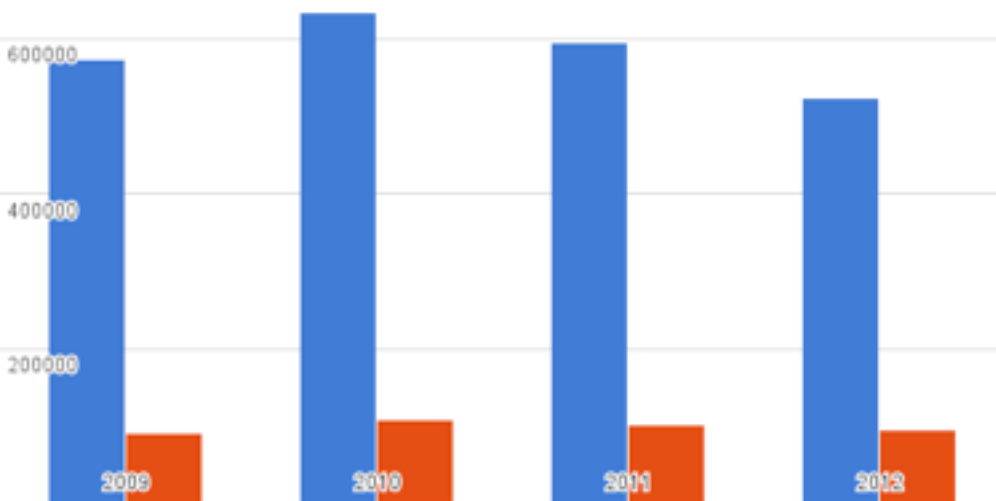
# Game design





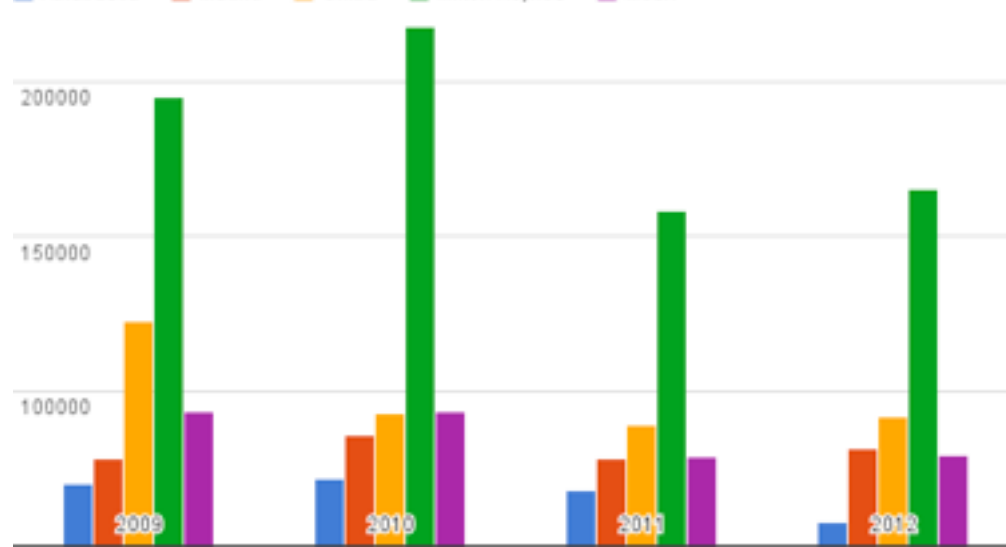
# Energy consumption week/weekend

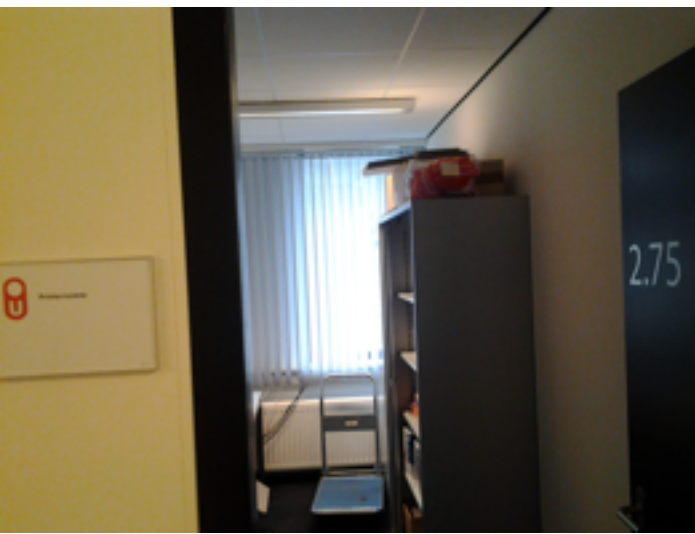
■ Week ■ Weekend



## Electricity consumption in kWh

■ Athabasca ■ Madrid ■ Chiba ■ Milton Keynes ■ Mean






**Generate ideas**



# Reflectie



START DE TEST   WWF.NL   50 MANIEREN

[Jouw uitslag & tips](#)   [Ontvang meer tips](#)   [Uitslag delen](#)   [Tip insturen](#)

## DE VOETAFDRIJTEST: HOE GROOT IS JOUW STUKJE AARDE?


JE HEBT DE TEST DOORLOPEN

[Uitslag](#)   [Top 5 tips](#)   [Wonen](#)   [Voeding](#)   [Lifestyle](#)   [Reizen](#)


Jouw voetafdruk is:

**4.81 hectare**

Als iedereen zo zou leven als jij, dan hebben we  
**2.7 aardbollen** nodig




Verdeling voetafdruk



- % Wonen
- % Voeding
- % Lifestyle
- % Reizen

De voetafdruk van de gemiddelde Nederlander is:

**6,3 hectare**



- % Wonen
- % Voeding
- % Lifestyle
- % Reizen


Je kunt je voetafdruk verkleinen door een aantal tips in de praktijk te brengen. Kies jouw tips om je voetafdruk te verkleinen.


[► Kies jouw tips om je voetafdruk te verkleinen](#)


MAAK KANS OP LEUKE PRIJZEN!

Stuur ons jouw tip onder een leuke voetafdruk.

[► Tip insturen](#)







# Study results

Game Element	Energy Consumption Behaviour (Mean)	Environmental Consciousness (Mean)
Information	5.50	5.67
Video	4.42	4.83
Action	4.33	4.08
Challenge	4.33	4.17
Activity	4.58	4.42
Badge	3.92	3.42
Prizes	3.17	2.83



Kalz, M., Börner, D., Ternier, S., & Specht, M. (in press).

# Critical decision making/ crisis training

- Time-pressure
- Different perspectives on problems
- Wicked problems
- Systemic impact of decisions on decision chain
- Knowledge & Skills & Personality factors





# Current solutions

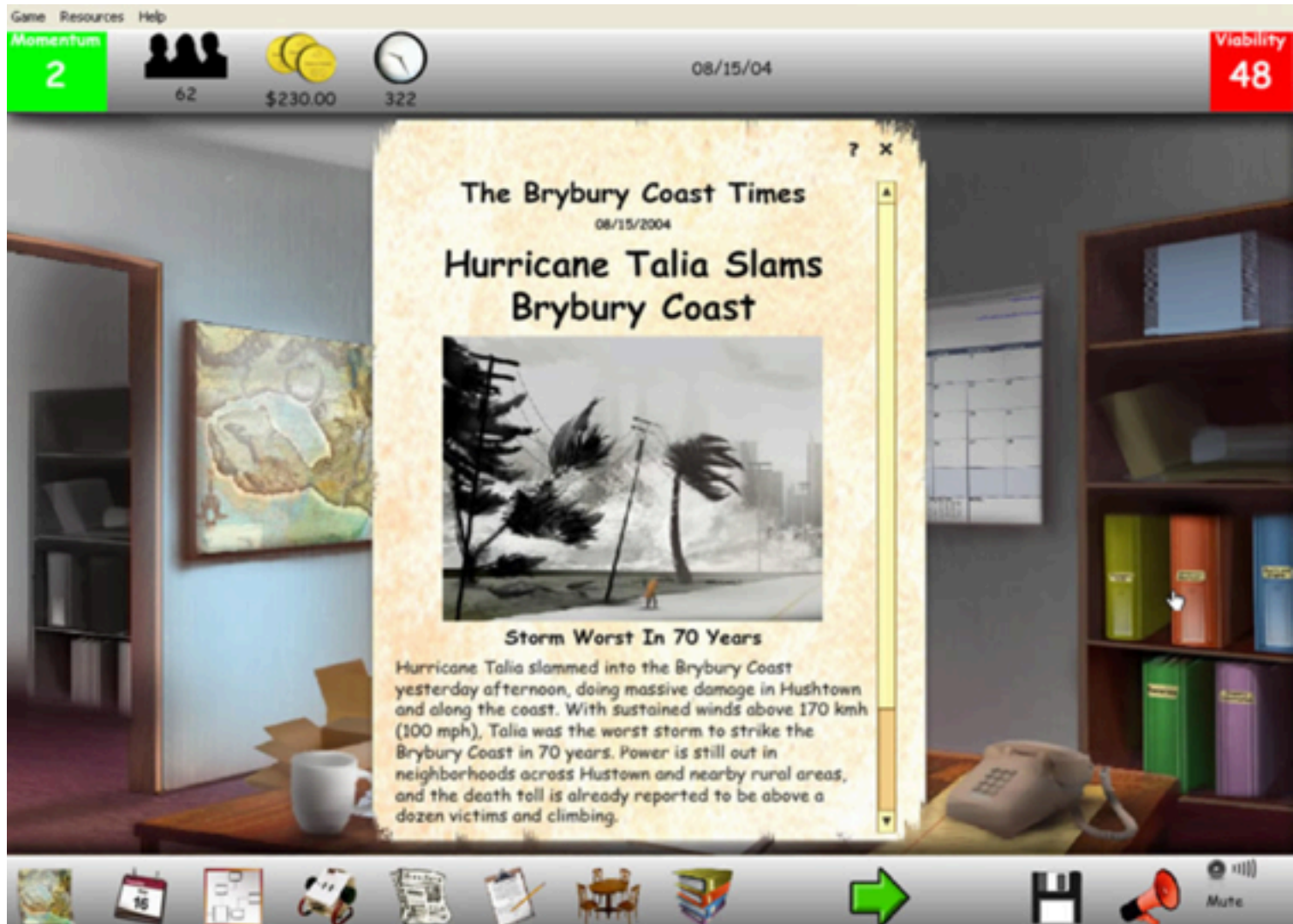
## High-fidelity simulations



some rights reserved by [ualberta-roco@flickr](https://www.flickr.com/photos/uAlberta-roco/)

# Current solutions

Fully modeled digital environments/ 3D environments



# ... and some findings

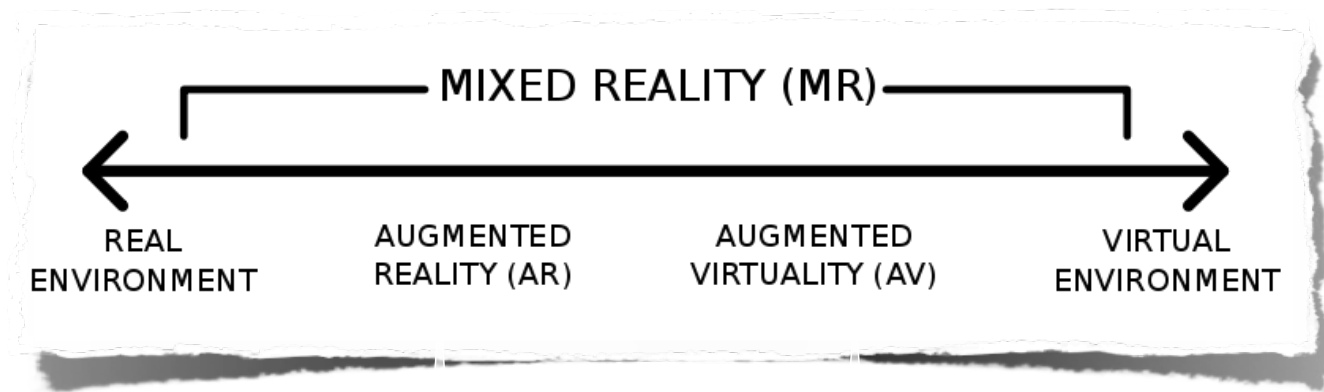


Chris Dede/Harvard

No proven correlation between learning gain and immersion level...future research should focus on limited immersion experiences, for example augmented reality



# The MR continuum

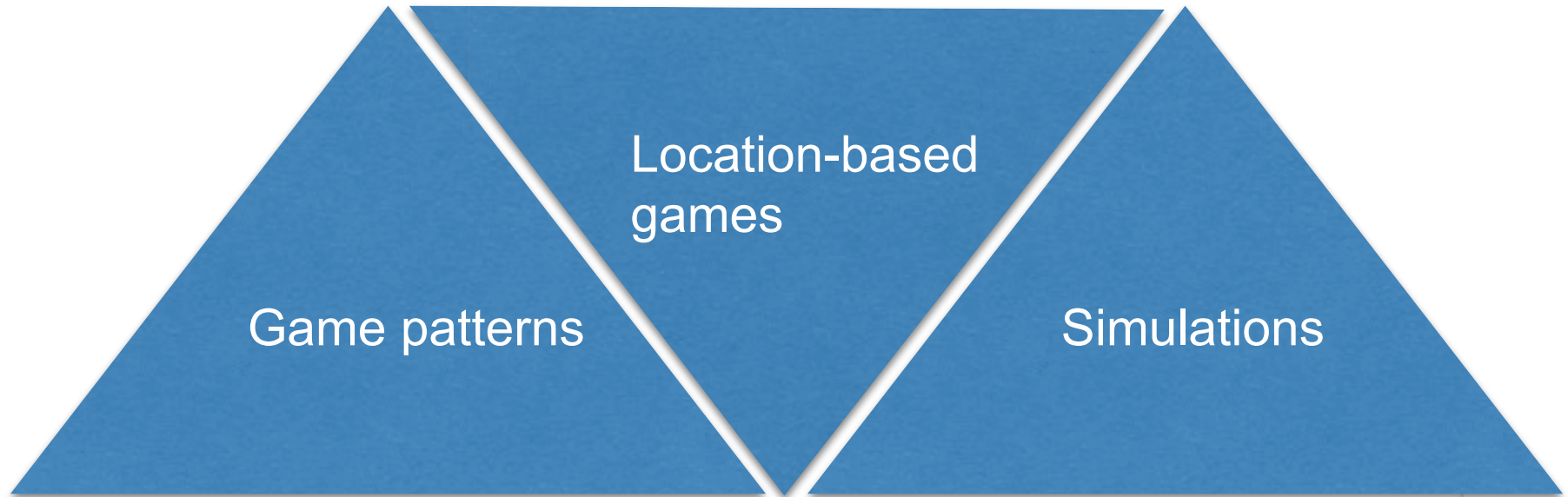


- Real environment
- enriched with virtual objects

- Virtual environment
- enriched with virtual objects

Milgram & Kishino, 1994

# Serious mobile location-based simulation game?





# Example 3: UNHCR

- Starting point: Need for innovation of training scenario
- High costs and very little flexibility
- Goal: A flexible, authentic and mobile solution



# Example 3: Setup

- Roles:

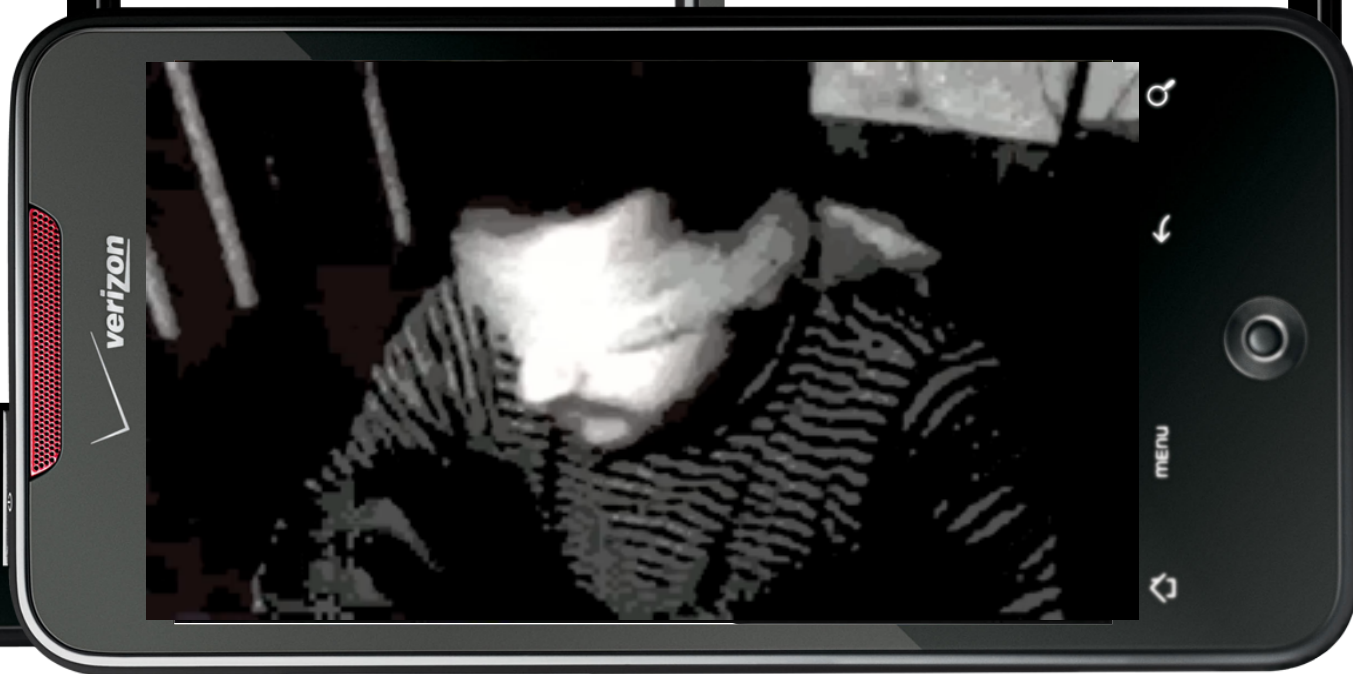
- Director
- Security manager
- HR Manager

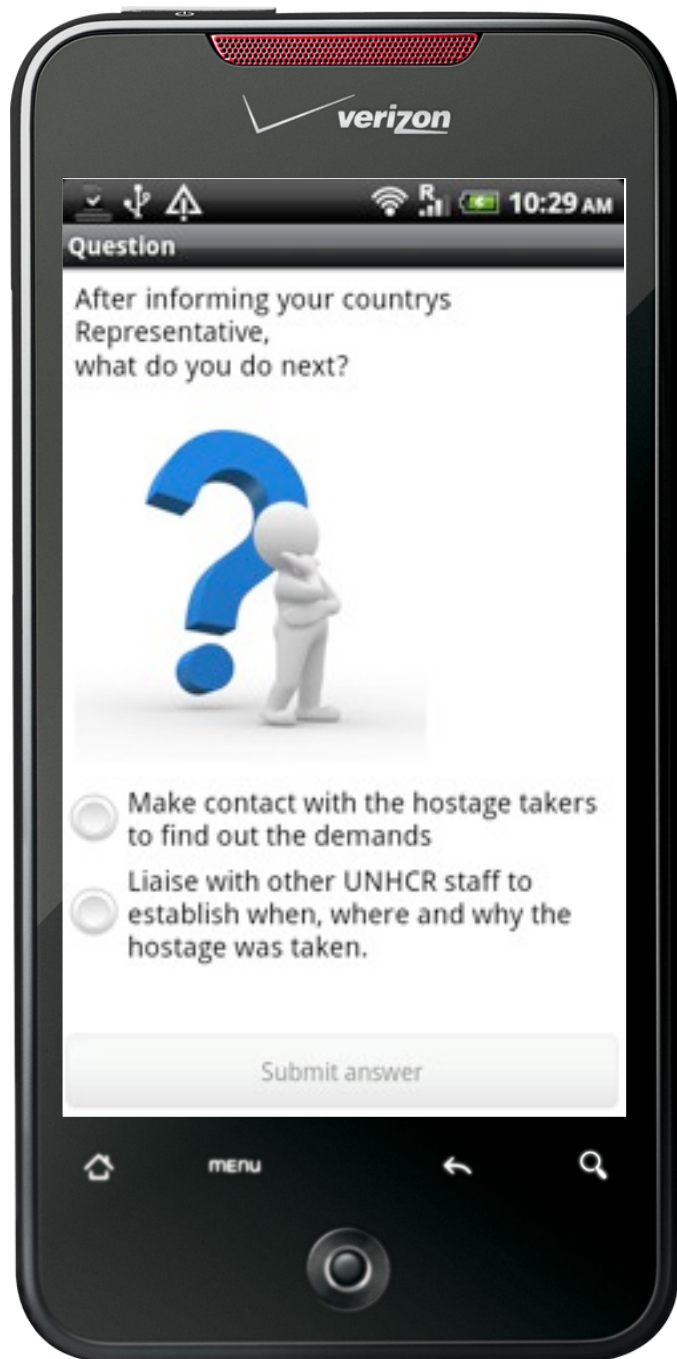


- Goals:

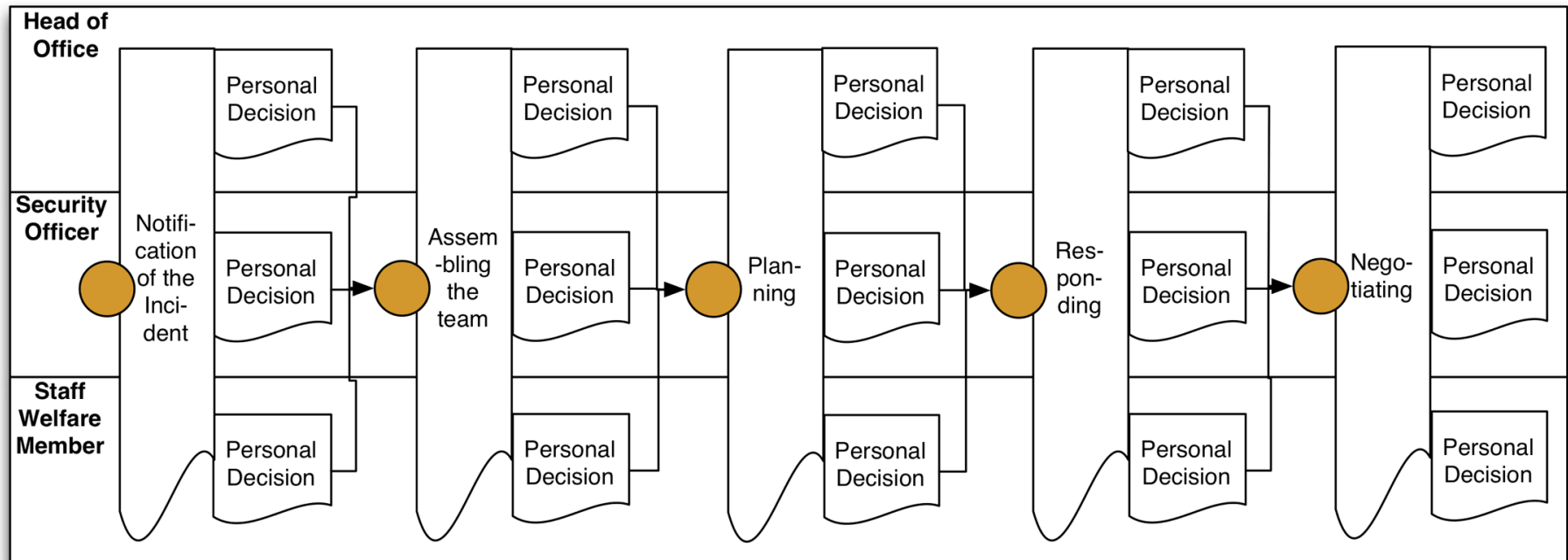
- Reusable mobile learning scenarios
- Notifications and 'in-situ' Assessment
- Semi-automatic management of the scenario
- Recording of activities for debriefing
- Higher level of preparedness







# Fallstudie 1: Learning/Game Design





# Example 3: Summary

- Evaluation on Level 1 and partly 2 of Kirkpatrick evaluation model(1994)



- High acceptance of participants and trainers, increase of awareness for efficient communication and central role of head of staff
- Alternative scenarios replaces partly classical training
  - new application areas in preparation



# Example 3: Future work

- Impact of specific game patterns (e.g. counter for decision making) on stress level and authenticity of experience



- Focus on learning transfer rather than knowledge building



# Example 4: HeartRun



- Societal Problem:
  - Approx. 350 000 people die each year from a cardiac arrest in Europe (ERC Statistic)
  - Limited amount of training, and even if people are trained, limited willingness to help
- Problem: Huge gap between training situation and application situation



# Example 4: Setup



- Roles:
  - Resuscitation player
  - Defi player
  - Documentation player



- Goals:
  - Impact on retention on knowledge
  - Impact on willingness to help
  - Attitudinal changes



# HeartRun: Example

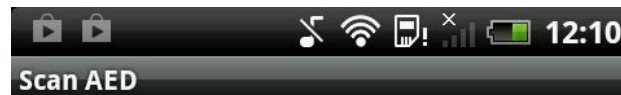




# HeartRun: Screendesign

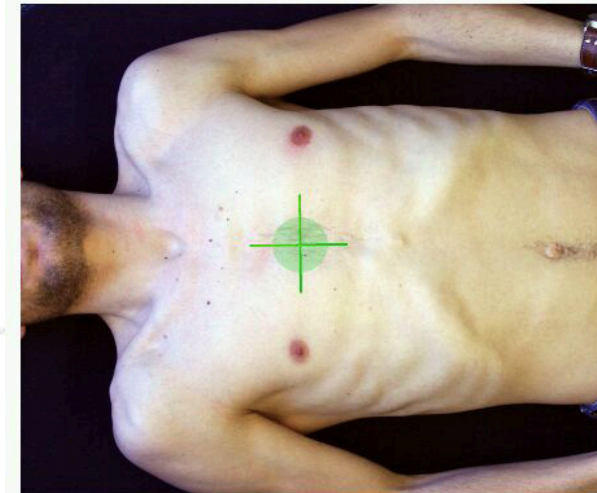


The game is based on messages which will appear on your device. When closing this message, you will already see the next one. You close this message by using the BACK Button. To open a message, you have to click on it. Messages which you have read are greyed out.



If you stand in front of it, scan the barcode attached to it.

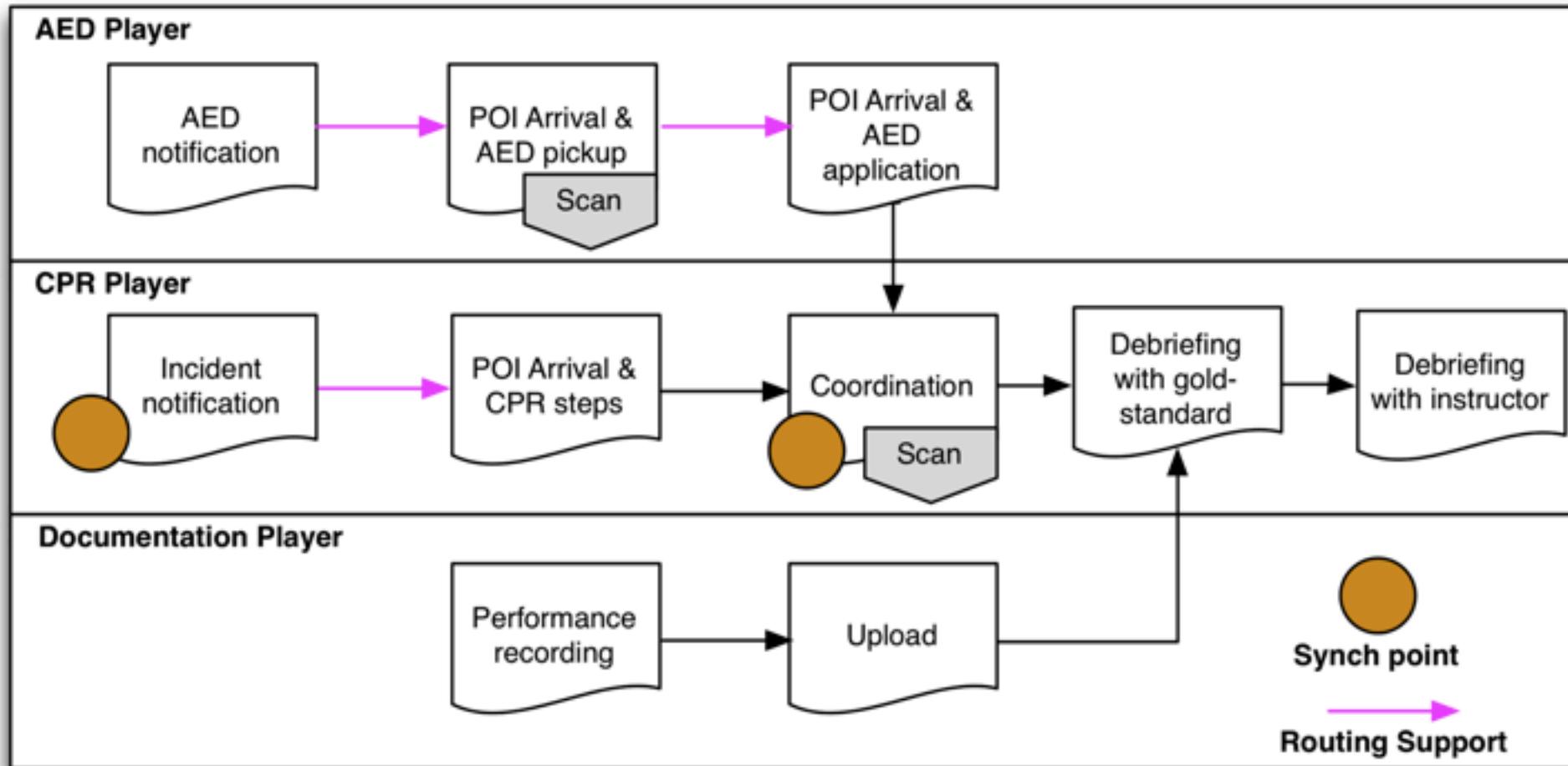
To do this, **press the barcode icon** below and hold the advice in front of the barcode. It will scan automatically.



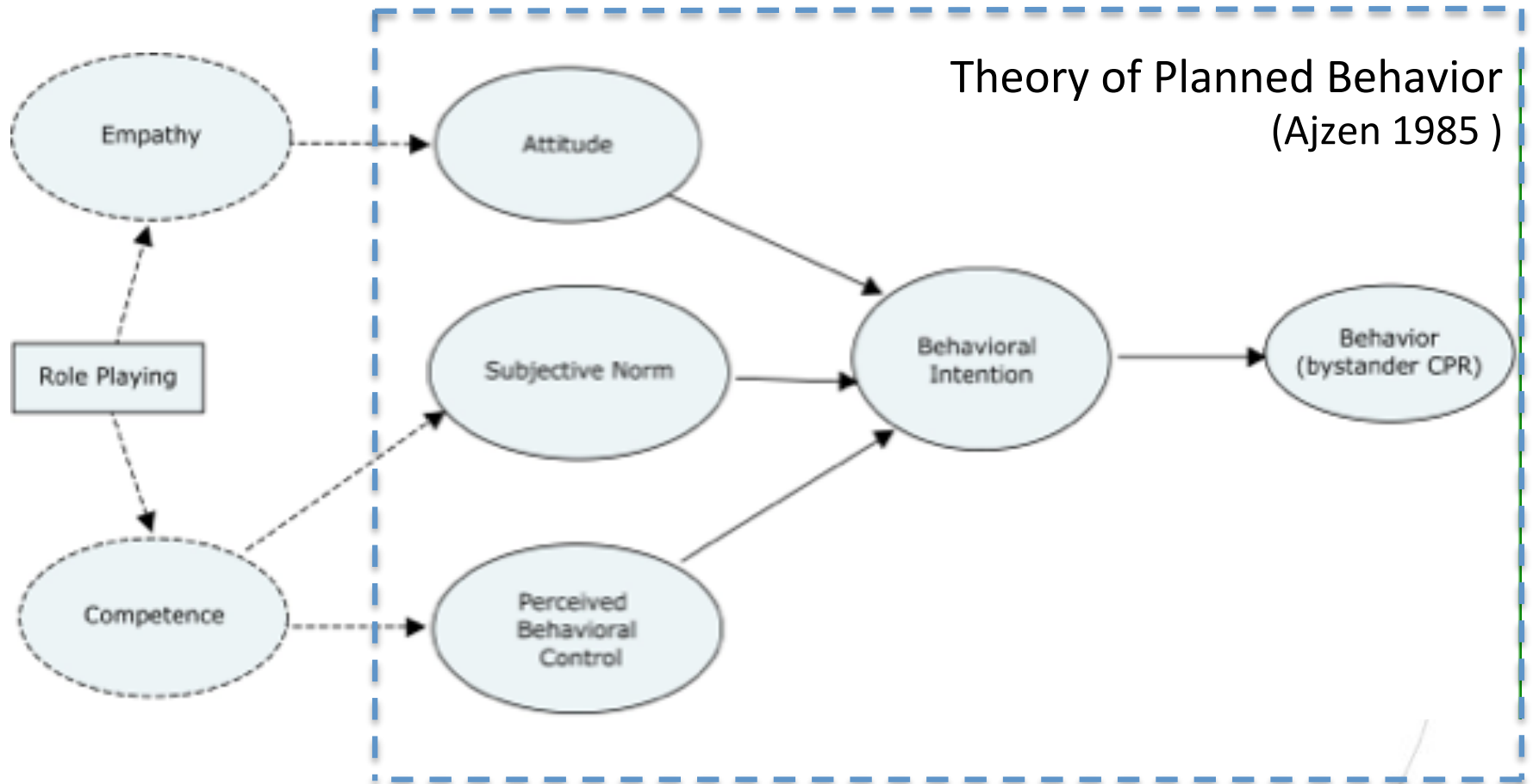
Continue CPR until an AED arrives or emergency providers can take over.

If other bystanders are present, change the person giving chest compressions

# Example 4: Learning/Game Design



# Research Model

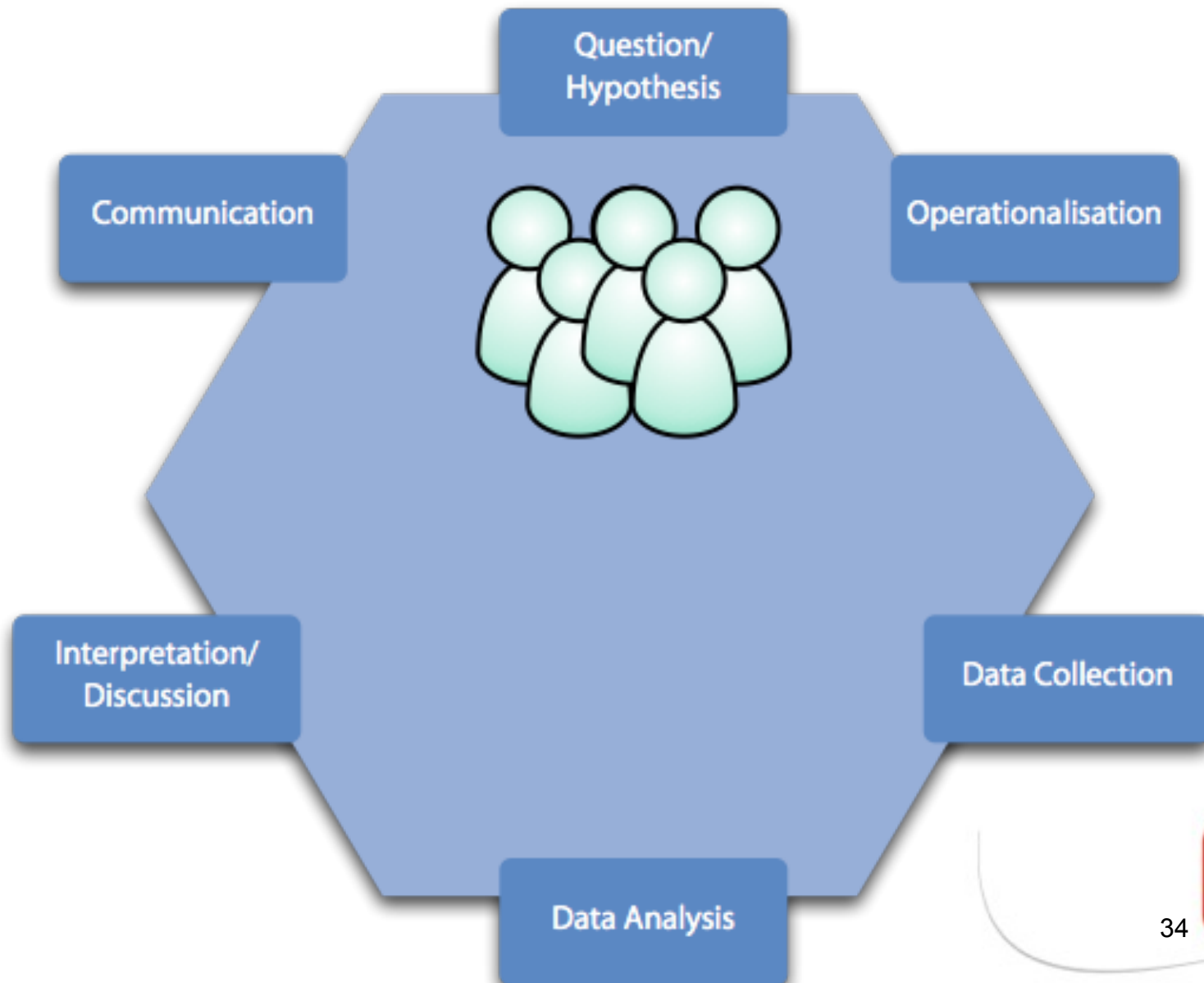


# Example 4: Summary

- Formative study about game design finalized (Kalz et al., 2013; Schmitz et al., 2013)
- Currently data collection with regard to level 2 of evaluation model of Kirkpatrick (1994)



# Example 5: Inquiry-based learning





# Inquiry-based learning

**Challenge 1:** A lack of inquiry skills

**Challenge 2:** curiosity is not supported

**Challenge 3:** Construct personal conceptual knowledge.

**Challenge 4:** Linking e-learning with inquiry.

**Challenge 5:** How to measure impact?

**Objective 1:** To provide smart, adaptive inquiry support.

**Objective 2:** Bridge formal and informal learning activities.

**Objective 3:** personal inquiry projects and link everyday life and classroom teaching.

**Objective 4:** Create an open source toolset.

**Objective 5:** we SPOT will evaluate the impact.

Theory and Models

Requirements Specification

Diagnostic Instrument

Inquiry Course & Templates

Mobile Clients

Services

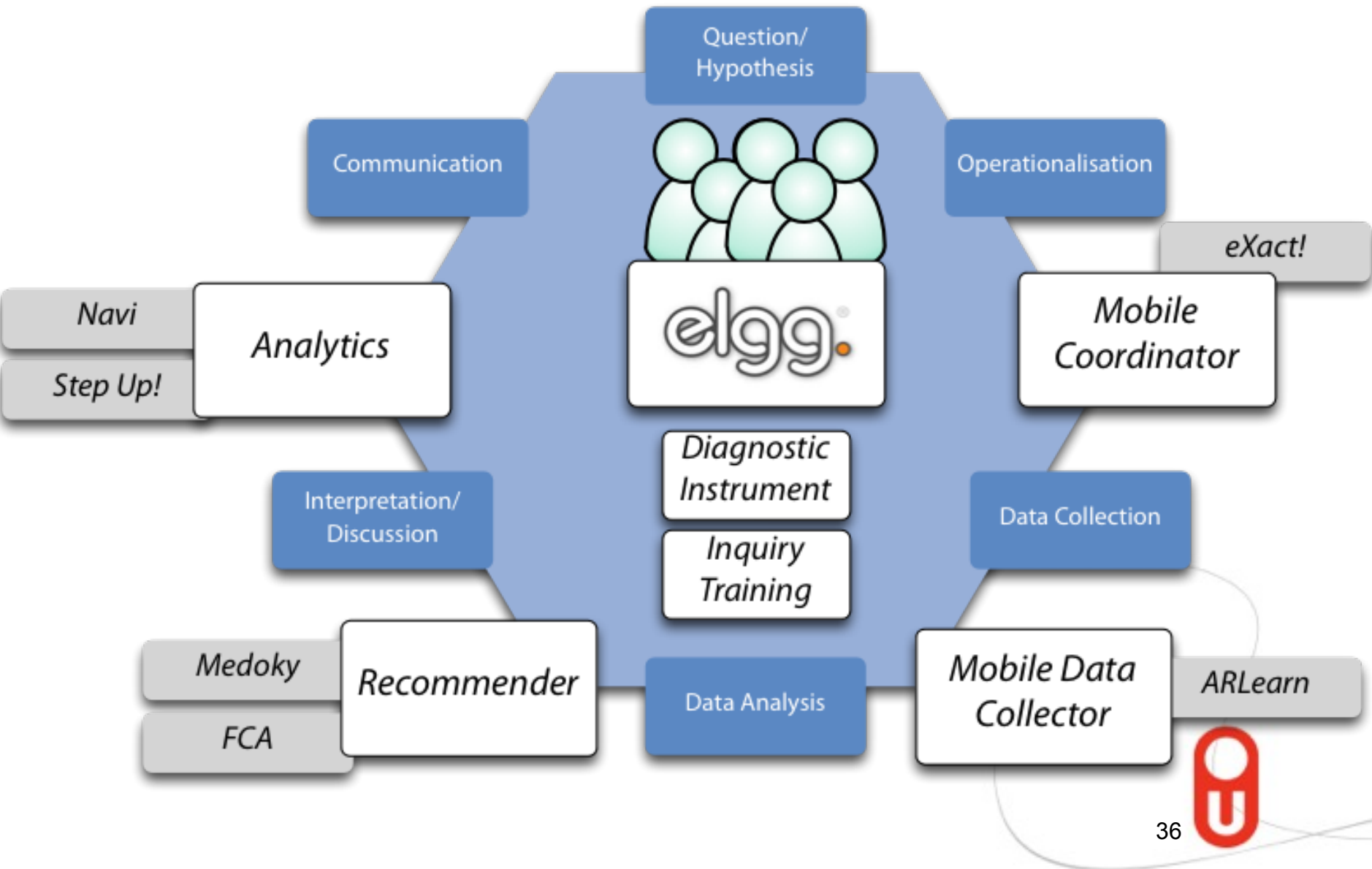
Classroom Clients

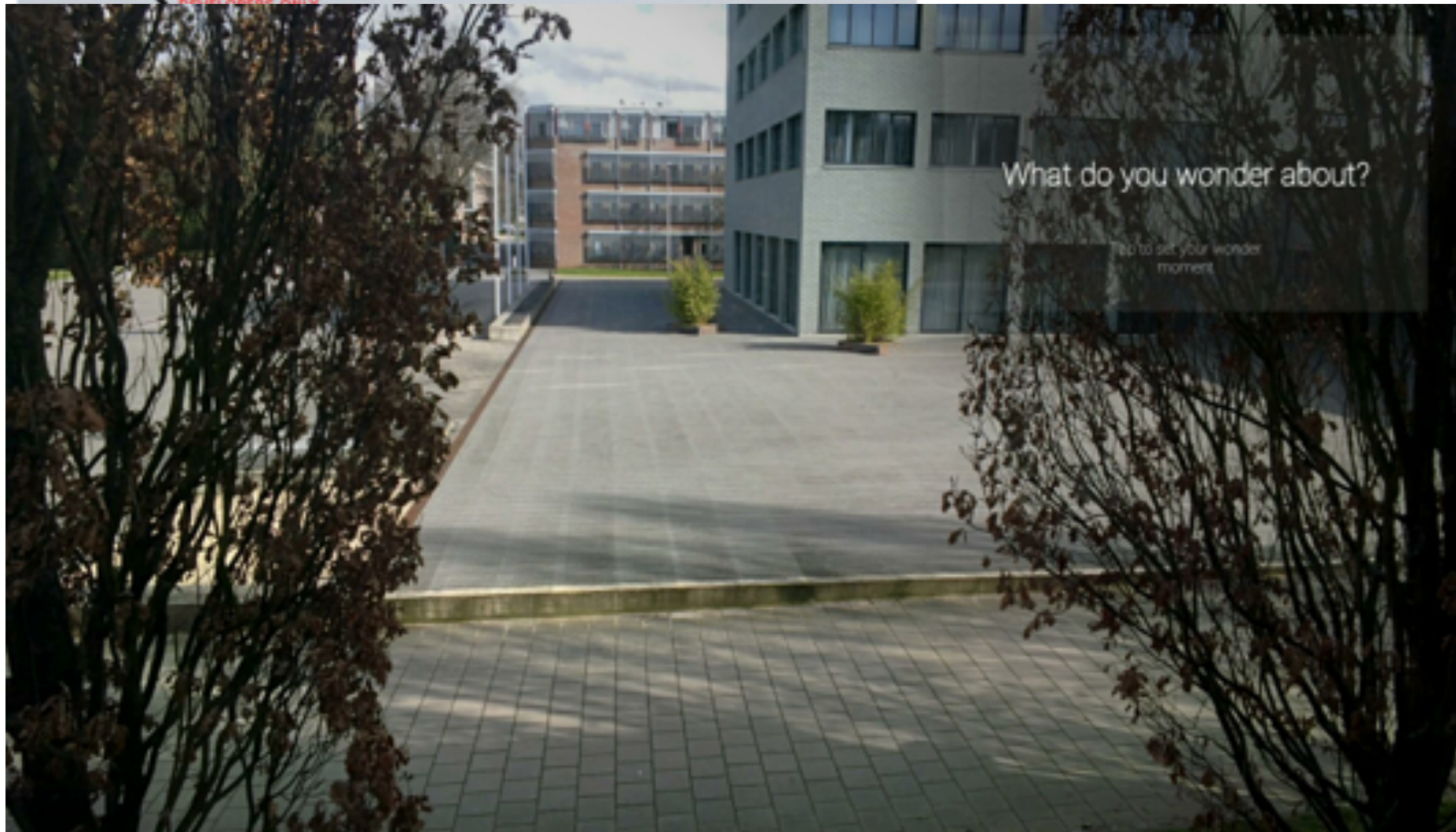
Integrated Pilot Setups

Evaluation Report and Publications



# Inquiry-based learning





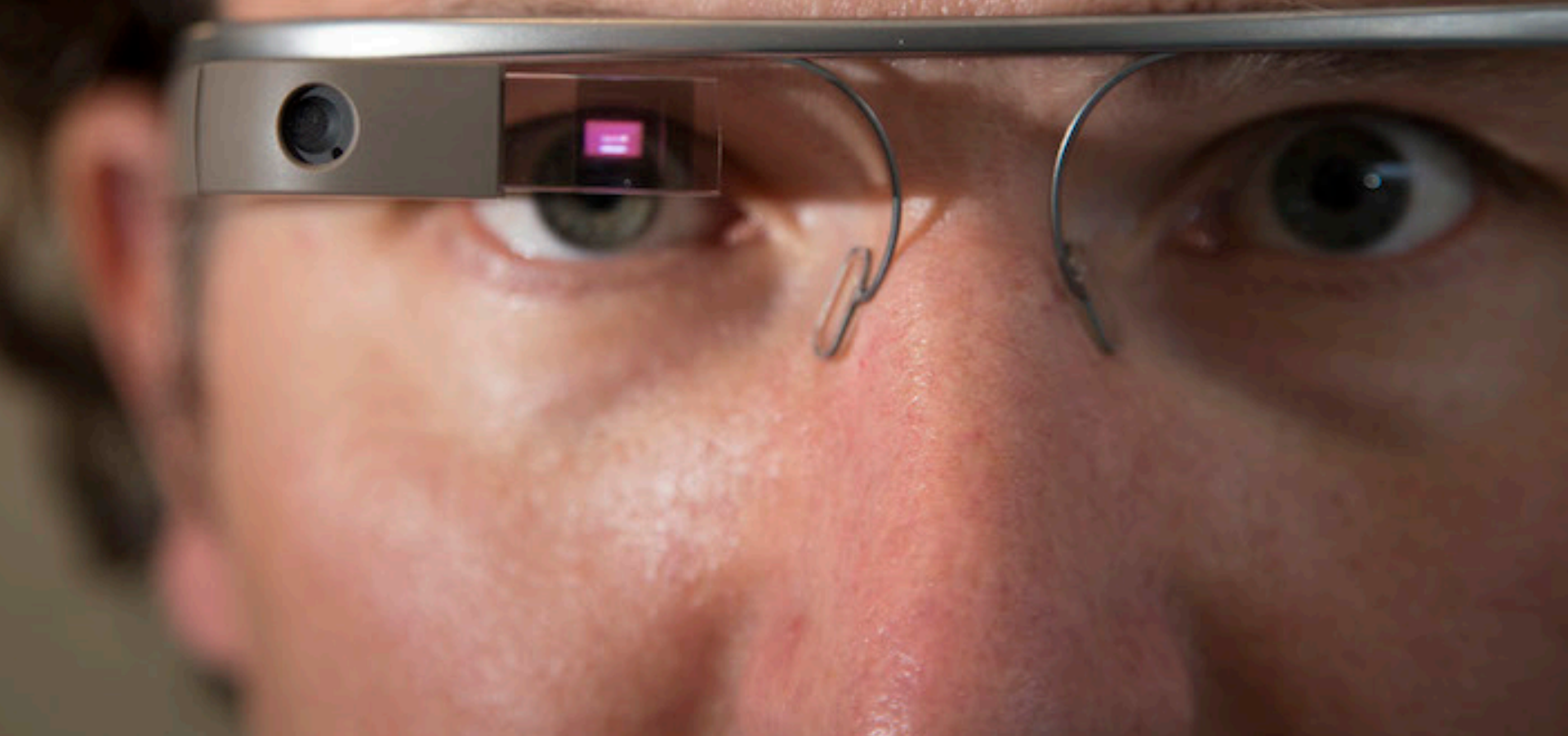




Zarraonandia, Aedo, Díaz, & Montero, 2013

No one's been able to demonstrate a high-performance see-through display. This side-view display that you seen in Google Glass and in the Oakley Airwave Snow goggles is...a recognition of the fact that no one has solved the transparent display problem.

**Justin Rattner**





# ARLearn: Mobile Serious Game Platform

- OpenSource (<https://code.google.com/p/arlearn/> & <http://www.ou.nl/arlearn>)
- Web-based authoring environment
- Game repository with CC-licensing
- Portfolio-view for debriefing



# ARLearn: Mobile Serious Game Platform

ARLearn open-source suite for educators and learners

Scripting a logic  
reusable game-logic description

Order	Title	Message Type
1	welcome message	Narrator Item
2	Trailer	Video Object
3	Emergency Call AED	Audio Object
3	Emergency Call	Audio Object
4	The Victim	Narrator Item
5	Task	Narrator Item
6	Emergency Number	Narrator Item
7	Dialling	Narrator Item
8	What is the next thing to do?	Multiple Choice Test
9	Not breathing normally?	Narrator Item
10	Cardiac Arrest	Narrator Item

**Configuration for 'Not breathing normally?'**

**Title:** Not breathing normally? **Order:** 9

☐ Position on map ☐ Automatically Launch

☒ Rich text description Editing

**Set Font ...** **Set Font Size ...**

If somebody collapsed

- look for chest movement;
- listen at the victim's mouth for breath sounds;
- feel for air on your cheek;
- decide if breathing is normal, not normal or absent.

**Action based Dependency**

☒ Has dependency

**Message:** What is the next thing to do?

**Action:** Turn the victim onto his back

**Scope:** if action performed by user

**Role:**

**Advanced**

**Save**



In Cooperation with  
Boğaziçi University and Kadir Has University

# 13<sup>th</sup> World Conference on Mobile and Contextual Learning

November 3-5, 2014

Kadir Has University, Conference Center- Istanbul, Turkey

SCIENTIFIC CORRESPONDENCE



ORGANIZATION SECRETARIAT



<http://www.mlearn.org>



# Related papers by our group

Kalz, M., Börner, D., Ternier, S., & Specht, M. (accepted). Mindergie: A pervasive learning game for pro-environmental behaviour at the workplace. In: Wong, L.-H., Milrad, M., & Specht, M. (Eds.). *Seamless Learning in the age of mobile connectivity*. Springer, Heidelberg/Berlin.

Klemke, R., Ternier, S., Kalz, M., Schmitz, B., & Specht, M. (2013, 26-27 September). Multi-stakeholder decision training games with ARLearn. In D. Milosevic (Ed.), *Proceedings of the fourth international conference on eLearning (eLearning 2013)* (pp. 1-9). Belgrade Metropolitan University, Belgrade, Serbia.

Schmitz, B., Ternier, S., Klemke, R., Kalz, M., & Specht, M. (2013). Designing a mobile learning game to investigate the impact of role-playing on helping behavior. In D. Hernández-Leo et al. (Eds.), *Scaling up Learning for Sustained Impact. Proceedings of European Conference on Technology Enhanced Learning (EC-TEL)*, LNCS 8095 (pp. 357–370). Berlin Heidelberg, Germany: Springer-Verlag.

Kalz, M., Schmitz, B., Biermann, H., Klemke, R., Ternier, S., & Specht, M. (2013). Design of a game-based pre-hospital resuscitation training for first responders. In A. Holzinger, M. Ziefle, & V. Glavinić (Eds.), *SouthCHI 2013*, LNCS 7946 (pp. 363-372). Germany: Springer, Heidelberg.

Ternier, S., Gonsalves, A., Tabuenca, B., de Vries, F., & Specht, M. (2012). Supporting Crisis Simulations with the ARLearn Toolkit for Mobile Serious Games. In Glahn, C. (Ed.) *PfP Consortium Quarterly Journal. Mobile Learning in Security and Defense Organizations*. PfP Consortium. Garmisch-Partenkirchen, 19-29.



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Gonsalves, A., Ternier, S., De Vries, F., & Specht, M. (2012). Serious games at the UNHCR with ARLearn, a toolkit for mobile and virtual reality applications. In M. Specht, M. Sharples, & J. Multisilta (Eds.), *Proceedings of 11th World Conference on Mobile and Contextual Learning (mLearn 2012)* (pp. 244-247). October, 16-18, 2012, Helsinki, Finland. <http://ceur-ws.org/Vol-955/>

Ternier, S., Klemke, R., Kalz, M., Van Ulzen, P., & Specht, M. (2012). ARLearn: augmented reality meets augmented virtuality [Special issue]. *Journal of Universal Computer Science - Technology for learning across physical and virtual spaces*, 18(15), 2143-2164.





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